



EPA proposes action on Davis Mill Creek

Copper Basin Mining District Site
Polk County, Tennessee

EPA Region 4 Fact Sheet

EPA invites public comment on removal action proposed for Davis Mill Creek; open house set for May 15

IMPORTANT DATES

Public Comment Period

May 12 to June 11, 2003

Open House

Thursday, May 15, 2003

4 p.m. to 6 p.m.

Office of Glenn Springs Holdings, Inc.

127 Main Street, Ducktown, TN

Information is available for review

at the Copper Basin Information Repository
in the rear of the Chamber of Commerce
office on Main Street in Ducktown,
and online at:

www.epa.gov/region4/waste/copper

CONTACTS

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EPA Toll-free number: 1-800-435-9233

The U.S. Environmental Protection Agency (EPA) invites community members to attend an open house (also known as an availability session) on Thursday, May 15, from 4 p.m. to 6 p.m. at the office of Glenn Springs Holdings, Inc., (GSHI), 127 Main Street in Ducktown, Tennessee.

The open house will feature the results of a study conducted by EPA that evaluated alternatives to reduce contaminants in the water of Davis Mill Creek before it enters the Ocoee River. The alternative that is selected will be implemented as an EPA non-time-critical removal action (removal action) for a portion of Davis Mill Creek. EPA's study and proposed removal action described in this fact sheet are part of the investigation and cleanup of the Copper Basin Mining District site in southeast Tennessee.

EPA will accept public comments on the alternatives and the action proposed for a portion of Davis Mill Creek from May 12 through June 11, 2003. Community members will have the opportunity to review, ask questions, and discuss these alternatives and the proposed removal action with EPA representatives at the May 15 open house in Ducktown.

This fact sheet summarizes the alternatives evaluated and the removal action proposed for Davis Mill Creek. EPA encourages the public to comment on the alternatives and proposed action.

Copper Basin Site History

The Copper Basin Mining District site covers a large area in the mountains of southeast Tennessee. Extensive copper mining and processing operations in the Copper Basin began in the 1850s and continued until 1987.

For over a century, mining and related processing activities provided economic stability in eastern Polk County and the towns of Copperhill and Ducktown. Many individuals and companies were involved in mining, refining, and manufacturing operations. At its peak, the Polk County copper industry employed more than 2,500 people.

Mining and related activities resulted in various environmental effects. By the late 1800s, forests in the Copper Basin were clear-cut to provide fuel for open roasting of ore. Sulfur dioxide emissions from the roast yards destroyed the remaining vegetation, resulting in extensive topsoil erosion and a denuded landscape that remained for decades.

Mining, mineral processing, and sulfuric acid production generated waste rock, slag, tailings, and debris. Over the years, surface runoff from rainfall carried soil and waste materials into the streams.

Due to acid rock drainage in Copper Basin and waste from various sources, North Potato Creek, Davis Mill Creek, and their tributaries contain metals and have acidic conditions that will not support fish and other aquatic life. The two creeks discharge acidic water and metals into the Ocoee River.

Site investigations and regulatory actions related to spills, water quality, and other issues have taken place before and since the mines closed. Various actions have been carried out by private parties under legal agreements with EPA and the State of Tennessee. Water or wastewater treatment facilities have been constructed to address conditions in the North Potato Creek and Davis Mill Creek watersheds. Watershed refers to the land that produces storm water runoff and contains streams that run into a specific creek or river.

Numerous private and public water wells have been tested in the Copper Basin area. None of the wells has shown any site-related substances at levels of concern.

Several rounds of sampling also have occurred in the Ocoee River. In 1996, in response to questions about the river's suitability as an Olympic venue, EPA stated that metals in the river were not present at levels that would cause concerns for recreational use. EPA collected additional data on the Ocoee River during the past year, and is preparing human health and ecological risk assessments, which are expected to be available in late 2003.

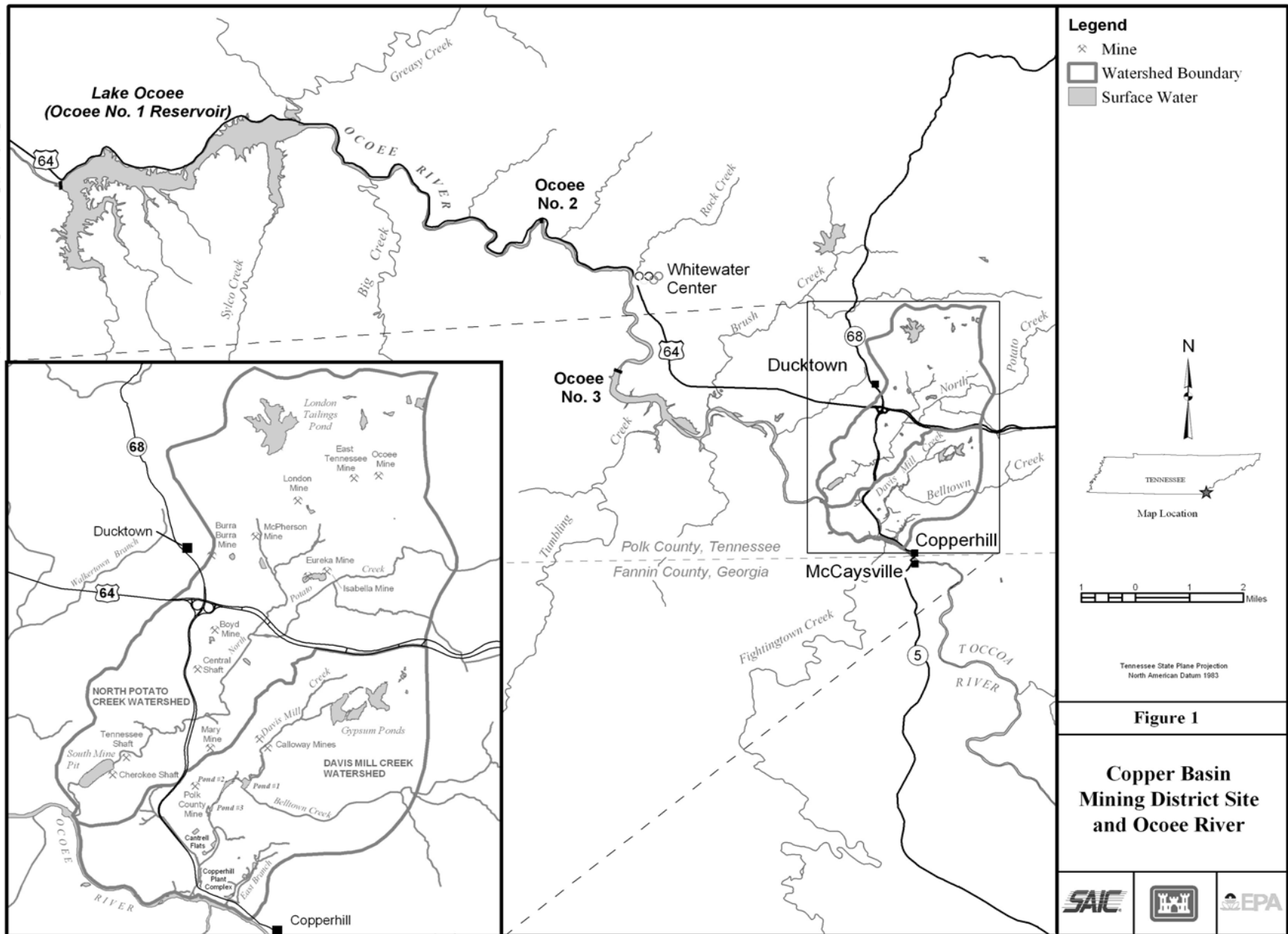
Current Site Status

In January 2001, representatives of EPA, the Tennessee Department of Environment and Conservation (TDEC), and GSHI signed a Memorandum of Understanding and several other legal agreements to address site hazards and other environmental concerns. The legal agreements require certain site investigations and study activities to determine appropriate cleanup actions. Interested readers can find copies of the agreements and other documents that provide more details about site activities in the locations listed under **Where to Find More Information** on page 12 of this fact sheet.

Figure 1 shows the areas that are the focus of investigation and cleanup activities for the Copper Basin site. The site includes portions of the North Potato Creek watershed, the Davis Mill Creek watershed, and the Ocoee River from the point where Davis Mill Creek enters the river downstream to Parksville Reservoir (Lake Ocoee).

Since early 2001, work plans have been developed and investigation activities undertaken in several site locations. Progress has been made in removing many site hazards, including mining structures, debris, and transformers with polychlorinated biphenyls (PCBs). Additional fencing is being installed to keep people out of dangerous areas, including mine collapses. Revegetation is being done on the upper tailings pond and other areas.

This fact sheet summarizes the alternatives that EPA evaluated for a removal action for a portion of Davis Mill Creek and provides the rationale for EPA's proposed action. EPA is recommending a removal action to reduce contamination in Davis Mill Creek before the water enters the Ocoee River. This removal



action will work in combination with the ongoing treatment of Davis Mill Creek water at the Cantrell Flats water treatment plant. The removal action is an interim measure until an overall plan can be implemented to improve water quality in the Davis Mill Creek watershed.

Study Area Characteristics

EPA studied the portion of the Davis Mill Creek watershed that includes approximately the last mile of the main channel of the creek, before it reaches the Ocoee River, and one major tributary of the creek, as shown in Figure 2.

The Davis Mill Creek watershed contains over 15 million tons of mining-related waste materials. Acid rock drainage (acidic water) dissolves metals in the wastes, including aluminum, copper, iron, manganese, and zinc. The acidity and metals severely degrade water quality in Davis Mill Creek and the Ocoee River.

The Ocoee River downstream of Davis Mill Creek has concentrations of several metals that exceed TDEC water quality standards. As a result, under the Clean Water Act, TDEC has listed the Ocoee River as not meeting the uses for which it was designated.

Davis Mill Creek contributes only a small part of the total water in the Ocoee River. However, due to acid rock drainage, Davis Mill Creek is a major source of acidity, as well as aluminum, copper, iron, manganese, zinc, and other heavy metals in the Ocoee River. The study and proposed removal action described in this fact sheet are part of EPA's broader investigation to address conditions in the Davis Mill Creek watershed.

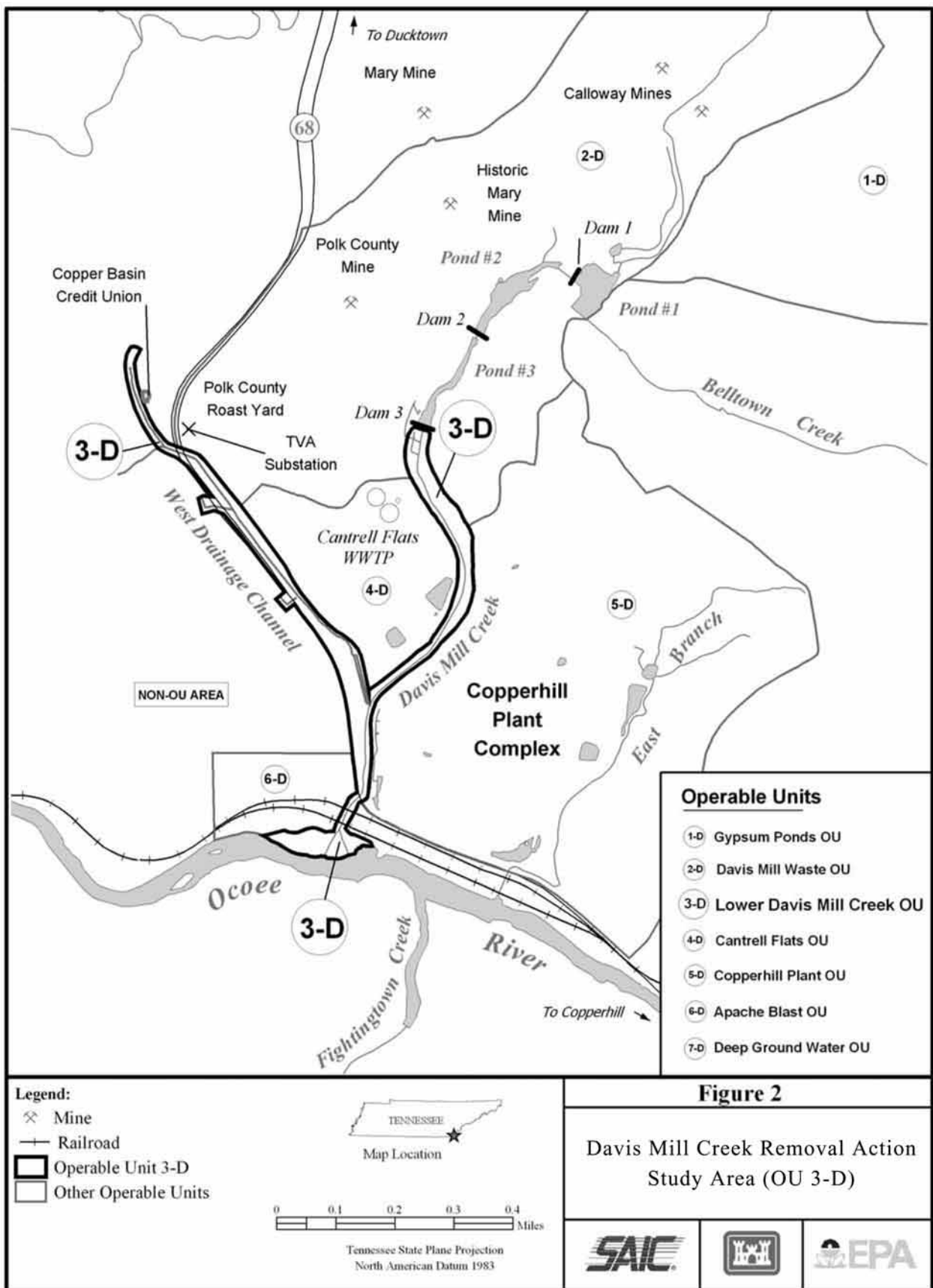
Three small dams in Davis Mill Creek allow sediment to settle out of the creek and not be discharged into the Ocoee River. These dams help form ponds 1, 2, and 3 (Figure 2). The last dam on Davis Mill Creek, dam 3, is nearly one mile from the Ocoee River.

Belltown Creek, a tributary contributing more than half of the water in Davis Mill Creek, is not contaminated before it enters the creek. At present, the base flow of Belltown Creek enters a pipe before it reaches Davis Mill Creek and is carried to a point just below dam 3. However, storm water runoff from the Belltown Creek watershed is not diverted through the pipe; as a result, it enters Davis Mill Creek just above pond 1 and becomes contaminated.

Under a legal agreement with EPA, GSHI refurbished the Cantrell Flats water treatment plant, which handles process water from the plant and storm water from the plant site. In November 2002, the Cantrell Flats plant began treating water from the upper part of Davis Mill Creek, behind dam 3 and just above the Davis Mill Creek study area. The treatment process uses lime and removes more than 90 percent of acidity and metals in the water. After treatment, the water is discharged into the Ocoee River. The Cantrell Flats plant treats normal flows from Davis Mill Creek, but storm runoff that overflows dam 3 enters the Ocoee River untreated.

Under a legal agreement with EPA, GSHI will install a large pipe to divert both the base flow of Belltown Creek and the flow from a large storm event (up to 5.7 inches of rain in 24 hours) to prevent water from being contaminated before reaching the Ocoee River. This Belltown Creek water will be discharged into Davis Mill Creek, just below dam 3, at the point where the smaller pipe that carries base flow from Belltown Creek now enters Davis Mill Creek.

Another tributary of Davis Mill Creek, the West Drainage Channel, enters the creek between dam 3 and the Ocoee River. This tributary drains the area on both sides of Highway 68, including areas behind the old company store and the Copper Basin Credit Union, as well as the area below the TVA substation. The West Drainage Channel is contaminated with heavy metals (mostly aluminum and copper) by the time it reaches Davis Mill Creek.



Dramatic changes in water quality and the creek bed in Davis Mill Creek from dam 3 to the Ocoee River have been observed since the treatment of the creek began in November 2002. Limited sampling and direct observation show improved water quality and hardening of the creek bottom. Therefore, this section of the creek will be monitored for up to one year to determine whether the diverted Belltown Creek water is degraded below acceptable State standards by the sediments or infiltrating groundwater before it reaches the Ocoee River. Depending on monitoring results, appropriate action will be taken, which may include, but is not limited to, lining the remainder of the channel with limestone rip-rap (rock), removing sediments, or extending the diversion pipe to the Ocoee River.

Study Findings

Contamination in Davis Mill Creek comes from mined ores and the type of rock that naturally occurs in the Copper Basin. Mining, mineral processing, manufacturing, and especially waste disposal created severe acid rock drainage, which makes it easier for heavy metals to get into the water. As a result, Davis Mill Creek and consequently the Ocoee River have been contaminated with heavy metals.

Detailed information about EPA's study of Davis Mill Creek and the removal action alternatives to reduce contamination entering the Ocoee River is available at the Copper Basin site information repository and the GSHI office in Ducktown.

Results of Risk Evaluation

Part of EPA's study of Davis Mill Creek and the Ocoee River includes evaluating risk associated with site conditions. EPA completed preliminary evaluations of potential risks to human health and the environment caused by exposure to hazardous substances in Davis Mill Creek and the Ocoee River.

Human Health Risks

EPA's evaluation of risk to human health from exposure to hazardous substances in the Ocoee River considered exposure to sediments, eating fish, and skin contact with and drinking river water. EPA found no significant cancer or non-cancer risks from these exposures in the Ocoee River downstream of Davis Mill Creek to the Ocoee No. 3 reservoir.

EPA's detailed human health risk assessment will be available later in 2003.

Ecological Risks

EPA evaluated risk to aquatic life from exposure to hazardous substances in Davis Mill Creek and is conducting studies to quantify risk in the Ocoee River. Acid mine drainage has severely damaged ecosystems in Davis Mill Creek. High levels of acid in the creek have caused heavy metals to be released at levels acutely toxic (poisonous effect resulting from a single, short-term exposure to a toxic substance) to aquatic organisms.

In addition to the acid, aluminum, copper, manganese, and zinc occur at levels acutely toxic to aquatic life. Iron compounds and other metals rapidly coat the channel bottom, as well as leaves and other organisms as they fall into the water. For years, Davis Mill Creek and its tributary, the West Drainage Channel, have flowed unimpeded into the Ocoee River, degrading water quality and creating toxic conditions for fish and other aquatic life.

Objective and Scope of Proposed Removal Action

The objective of the proposed removal action is to minimize the discharge of contamination from Davis Mill Creek into the Ocoee River. This objective will be accomplished in two ways:

1. Treat water from a portion of Davis Mill Creek to remove contaminants before the water reaches the Ocoee River.
2. Divert clean water around Davis Mill Creek to avoid contamination with wastes and other materials in Davis Mill Creek.

EPA will implement this removal action to protect the Ocoee River, while the Agency develops additional actions to restore the Davis Mill Creek watershed.

EPA's proposed removal action for Davis Mill Creek complements another recently approved removal action for North Potato Creek. EPA approved the approach for treating water in the lower portion of North Potato Creek after receiving and considering public comments on the proposed action. GSHI will implement the North Potato Creek removal action. Details about this action and EPA's rationale for approving it are available at the Copper Basin site

information repository and the GSHI office in Ducktown.

Together, the removal actions in North Potato Creek and Davis Mill Creek will significantly reduce contamination in the Ocoee River and help restore the river's damaged ecosystems. EPA plans to investigate the river to determine whether additional actions are needed to restore the river's ecosystems from the mouth of Davis Mill Creek to the Ocoee No. 3 reservoir.

Removal Action Alternatives

EPA developed and evaluated six alternatives as potential removal actions.

Alternative 1: No Action

The no action alternative provides a base line to consider what would happen if no new action was proposed for the Davis Mill Creek study area. EPA considered the no action alternative based on conditions (a) before the Cantrell Flats plant began treating dry weather flows of upper Davis Mill Creek and (b) after treatment of these flows began at the plant in November 2002.

Alternative 2: Cantrell Flats Plant Treats Water; Belltown Creek Diverted to Ocoee River

Alternative 2 includes treating Davis Mill Creek water impounded behind dam 3 at the Cantrell Flats plant, except water that overtops the dam during storm events. Clean water from Belltown Creek would be diverted away from Davis Mill Creek to the Ocoee River until stream flow exceeds levels that would be created by a storm event of 5.7 inches of rain in 24 hours. On average, a storm of this size could be expected every 10 years.

Alternative 3: Belltown Creek Diverted to Ocoee River; Dams and Ponds Modified to Hold Storm Runoff

Alternative 3 includes the actions in alternative 2, plus dams 1 and 2 would be raised by 5 feet to increase their storage capacity. Ponds 1 and 2 would be modified so that normal base flows would be discharged, but water from storm events would be held in ponds and released gradually after the storms, allowing more water to be treated in the Cantrell Flats plant.

Alternative 4: Belltown Creek Diverted to Ocoee River; Retention Dams and Ponds Modified; Dam Constructed in Lower Davis Mill Creek

Alternative 4 includes the actions in alternative 3, plus a small dam would be constructed in lower Davis Mill Creek to capture water flowing from the lower West Drainage Channel, until stream flow exceeds levels that would be created from a storm event of 4.7 inches of rain in 24 hours. On average, a storm of this size could be expected every 5 years.

Uncontaminated water in the upper West Drainage Channel would be diverted to the Ocoee River until stream flow exceeds a storm event of 4.7 inches of rain in 24 hours.

A new water storage pond(s) would be constructed in the Cantrell Flats area; pumps would be installed to move water from the new dam area in lower Davis Mill Creek to the new storage pond(s) and on to the Cantrell Flats plant for treatment.

Alternative 5: Belltown Creek Diverted to Dam 3; Retention Dams and Ponds Modified; Base Flow of Lower West Drainage Channel Treated; Channel of Davis Mill Creek Lined with Rock

Alternative 5 includes the actions in alternative 3, except uncontaminated storm water from Belltown Creek would be diverted in a pipe to a point just below dam 3, but not to the Ocoee River. The size of the diversion would be the same as described for alternative 2.

Base flow from the West Drainage Channel would be captured and pumped to the Cantrell Flats plant for treatment. Runoff from storm events would flow into Davis Mill Creek and on to the Ocoee River.

The Davis Mill Creek channel in the study area will be lined with limestone rip-rap (rock) at the outfall of the new Belltown diversion pipe to slow the diverted water and stabilize sediments.

Alternative 6: Belltown Creek Diverted to Dam 3; Retention Dams and Ponds Modified; Runoff from Lower West Drainage Channel Treated/Diverted; Channel of Davis Mill Creek Lined with Rock

Alternative 6 includes the actions in alternative 3, except uncontaminated storm water from Belltown Creek would be diverted in a pipe to a point just

below dam 3, but not to the Ocoee River. The size of the diversion would be the same as described for alternative 2.

Uncontaminated water in the upper West Drainage Channel would be captured and diverted to the Ocoee River until stream flow exceeds a storm event of 4.7 inches of rain in 24 hours.

A new water pond(s) would be constructed in the Cantrell Flats area. Contaminated water from the lower portion of the West Drainage Channel would be captured and pumped to the new pond(s).

Pumps would be installed to move water from the new storage pond(s) to the Cantrell Flats plant for treatment. The Davis Mill Creek channel in the study area will be lined with limestone rip-rap at the outfall of the new Belltown diversion pipe to slow the diverted water and stabilize sediments.

Evaluation of Alternatives

The alternatives were evaluated according to EPA guidance for conducting a non-time-critical removal action. EPA uses three general criteria: effectiveness, implementability, and cost.

Effectiveness

EPA evaluated alternatives for effectiveness based on the success in reducing contaminants discharged from Davis Mill Creek to the Ocoee River. Contaminant reduction would be achieved either by treating the water before it reached the river or diverting clean water out of Davis Mill Creek to prevent contamination. EPA's evaluation showed that, under both dry and wet weather conditions, every alternative other than alternative 1 (no action) was effective in decreasing contamination from Davis Mill Creek by more than 90 percent. Figure 3 shows the percentage of total contamination from Davis Mill Creek that each alternative would remove.

Implementability

Implementability refers to the technical and administrative feasibility of implementing the alternative. EPA is required to meet the substantive requirements of all applicable regulations (see fourth Criteria for Detailed Analysis of Removal Action Alternatives on page 10).

All alternatives are expected to meet local, state, and federal requirements. It is possible that permits would be necessary for various actions in the creeks, including dam construction or modification (under alternatives 3, 4, 5, and 6), placement of rip-rap in lower Davis Mill Creek (alternatives 5 and 6), and diversion of the upper West Drainage Channel (alternatives 4 and 6). The TDEC permit for the discharge from the Cantrell Flats water treatment plant to the Ocoee River also may have to be modified under alternatives 4, 5, or 6. EPA believes these permits could be issued or modified with little difficulty or controversy.

All alternatives are technically feasible and could be implemented. Space constraints could limit the size of any new storm water storage pond(s) in the Cantrell Flats area, and the pond(s) would be sized based on available space.

Cost

EPA estimated how much it would cost to design and construct each alternative (the capital cost) and the costs to operate and maintain (O&M costs) the Cantrell Flats water treatment plant and other facilities (Figure 4).

Capital costs for alternatives 2, 3, 4, 5, and 6 range from over \$4.5 million to more than \$8 million.

Alternatives 2 and 5 are the least expensive; alternative 4 is the most expensive. O&M costs vary mostly based on the amount of water treated at the Cantrell Flats plant. O&M costs for a 10-year period range from under \$1 million to nearly \$2 million (alternative 4). O&M costs for alternatives 5 and 6 are slightly higher than those for alternatives 2 and 3 because these alternatives include treating flows from the upper West Drainage Channel.

Figure 3. Percent Reduction in Heavy Metals Flowing to Ocoee River from Davis Mill Creek Under Removal Action Alternatives

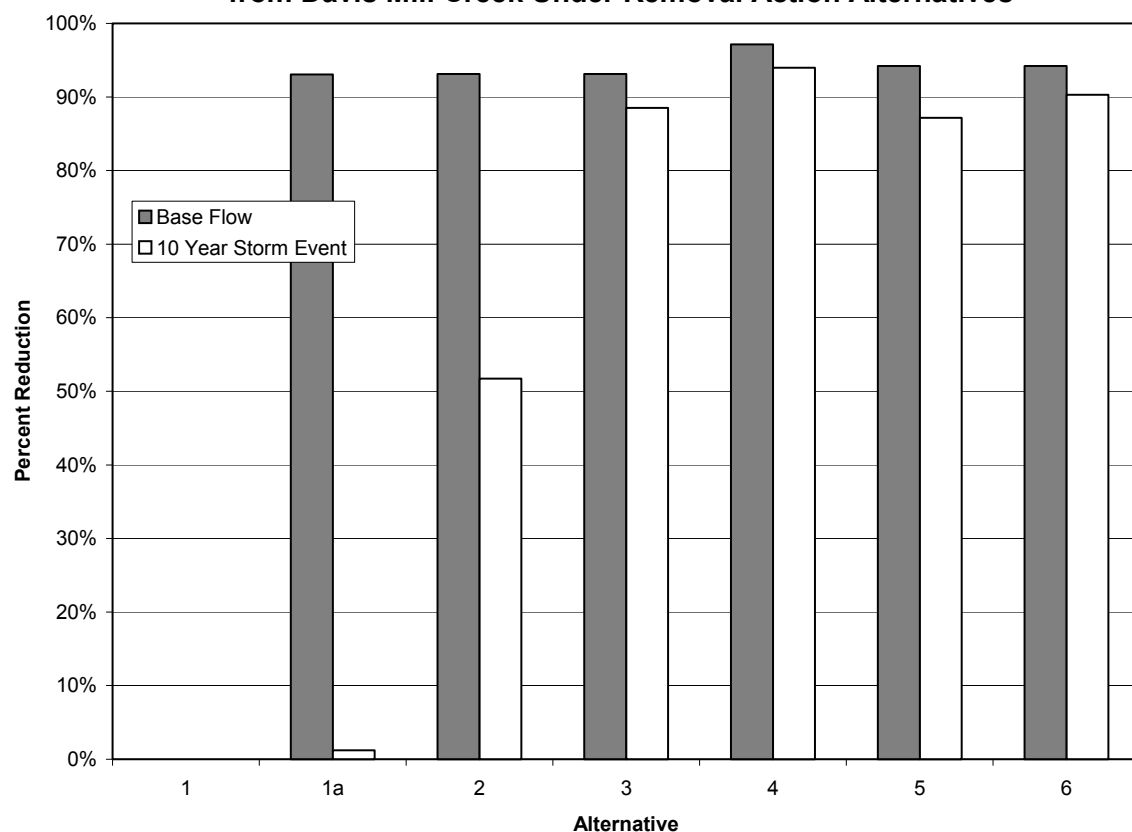
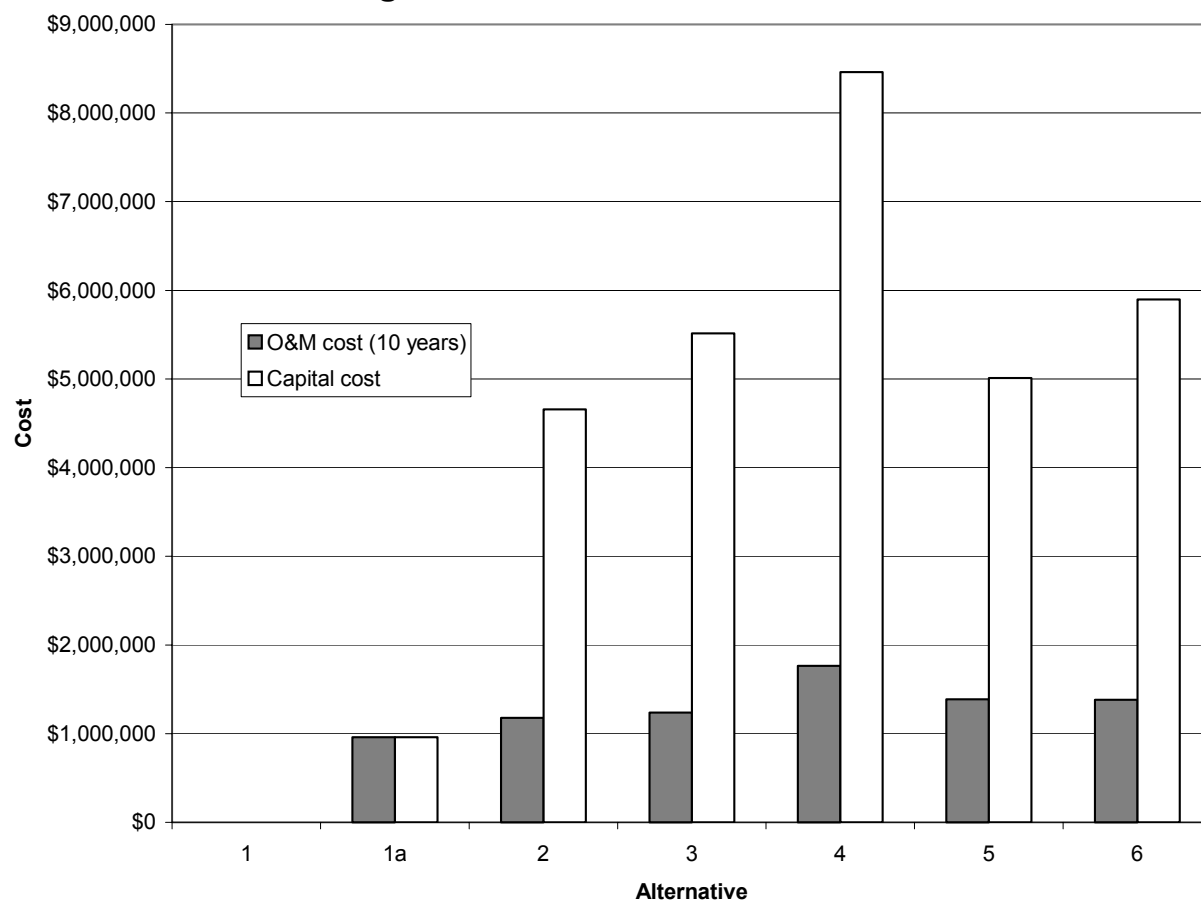


Figure 4. Costs for Removal Action Alternatives



EPA also completed a more detailed analysis of the removal alternatives, based on the following criteria:

Criteria for Detailed Analysis of Removal Action Alternatives

Overall protection of public health and the environment

Short-term effectiveness and protection of workers during implementation

Long-term effectiveness and ability to maintain control until a long-term solution is implemented

Ability to meet federal and state requirements

Ability to achieve removal action objectives by reducing the mobility, toxicity, and volume of substances

Technical and administrative feasibility of implementing the removal action

Costs, including capital and post-removal site control

State acceptance regarding technical and administrative concerns

Community acceptance regarding construction, operation, and other aspects of the action

TDEC has reviewed the information developed for the Davis Mill Creek study and concurs with the EPA proposed removal action described in this fact sheet.

Community acceptance of the proposed removal alternative will be evaluated after the public comment period ends and will be described in the responsiveness summary accompanying the action memorandum for the removal action.

EPA's Proposed Removal Action

Based on available information, EPA believes alternative 5 provides the best balance in meeting the evaluation criteria.

Alternative 5: Belltown Creek Diverted to Dam 3, Retention Dams and Ponds Modified; Base Flow of Lower West Drainage Channel Treated; Channel of Davis Mill Creek Lined with Rock

Alternative 5 includes the actions in alternative 3, except uncontaminated storm water from Belltown Creek would be diverted in a pipe to a point just below dam 3, but not to the Ocoee River. The size of the diversion would be the same as described for alternative 2. Figure 5 shows the key components of alternative 5.

Base flow from the West Drainage Channel would be captured and pumped to the Cantrell Flats plant for treatment. Runoff from storm events would flow into Davis Mill Creek and on to the Ocoee River.

The Davis Mill Creek channel in the study area will be lined with limestone rip-rap at the outfall of the new Belltown diversion pipe to slow the diverted water and stabilize sediments.

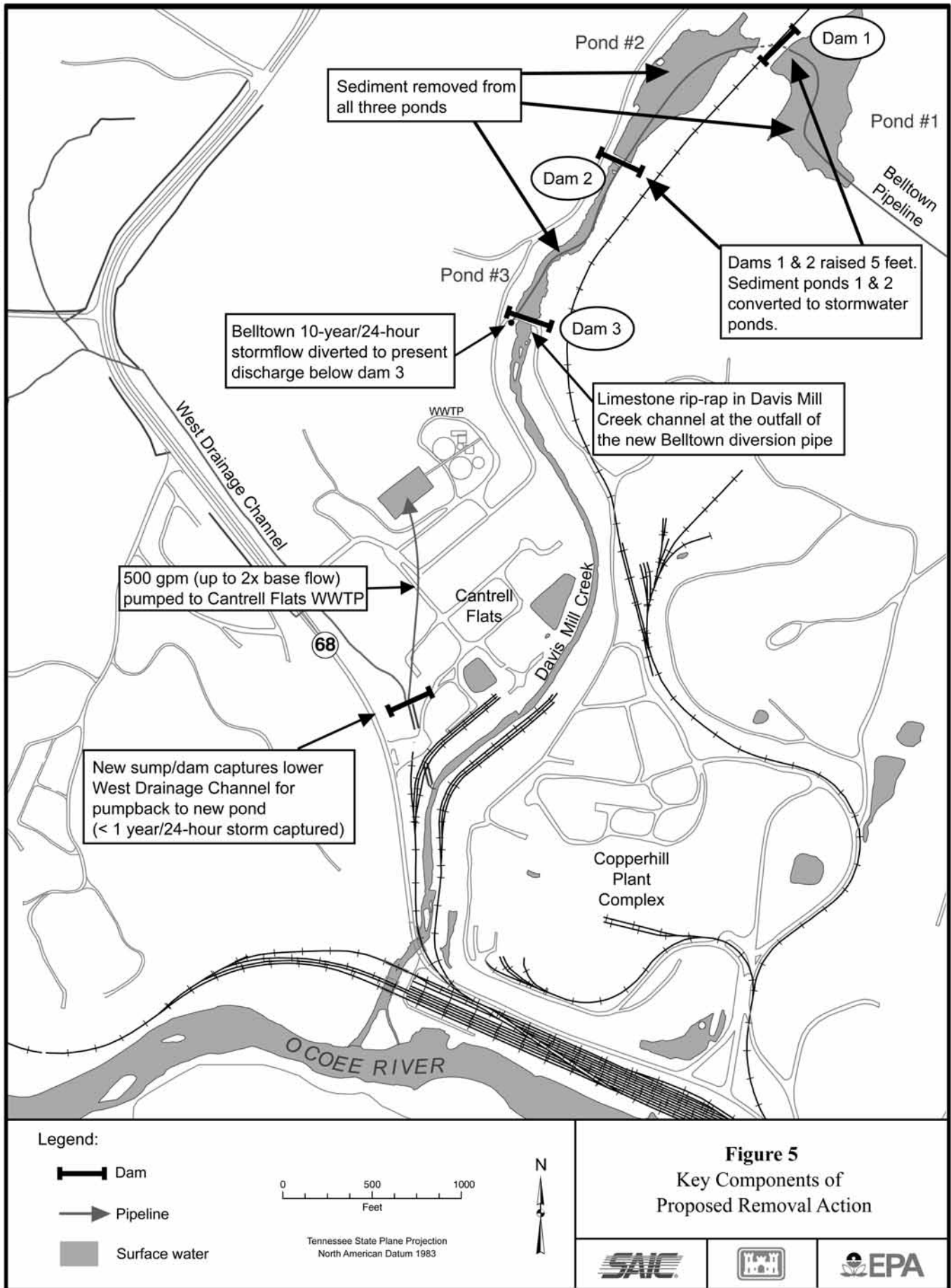


Figure 5
Key Components of
Proposed Removal Action



Rationale for EPA's Proposed Removal Action

EPA's analysis shows alternative 5 is effective in reducing the discharge of hazardous substances to the Ocoee River (Figure 3). Although alternative 4 is slightly more effective, it would cost substantially more.

Figure 4 shows the capital and O&M costs for each alternative. Alternative 5's capital construction costs are substantially lower than those for alternative 4 and slightly lower than those for alternatives 3 and 6. O&M costs under Alternative 5 are slightly higher than those for alternatives 2 and 3, largely because of the cost to treat the West Drainage Channel under dry weather conditions. (The Channel contributes high levels of aluminum and copper to Davis Mill Creek and the Ocoee River.)

All alternatives would reduce contaminants reaching the Ocoee River, but EPA believes that alternative 5 provides the best balance between protection of human health and the environment (as measured by contaminants prevented from reaching the Ocoee) and costs (as measured by capital construction and O&M costs).

EPA will consider all public comments and any new information before making a final decision on the Davis Mill Creek removal action.

Where to Find More Information

EPA encourages interested individuals to review the documents in the Administrative Record for the Davis Mill Creek Non-Time-Critical Removal Action. The Administrative Record is available to the local community at the following location:

Copper Basin Site Information Repository

Polk County/Copper Basin Chamber of Commerce

134 Main Street, Ducktown, Tennessee

Phone: (423) 496-9000

Hours: Monday - Friday, 9 a.m. to 5 p.m.

Information about the Davis Mill Creek Non-Time-Critical Removal Action is also available for review at:

Glenn Springs Holdings, Inc.

127 Main Street, Ducktown, Tennessee

Phone: (423) 496-7900

Hours: Monday - Friday, 8 a.m. to 5 p.m.

Community members are invited to attend an open house on Thursday, May 15, at the GSHI office in Ducktown any time from 4 p.m. to 6 p.m.

Information and displays about the Davis Mill Creek study area and proposed removal action will be available. Representatives from EPA, TDEC, and GSHI will be on hand to discuss the information and answer questions.

ITEMS TO REMEMBER

Public Comment Period

May 12 to June 11, 2003

Open House

Thursday, May 15, 2003

4 p.m. to 6 p.m.

Office of Glenn Springs Holdings, Inc.

127 Main Street, Ducktown, TN

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U.S. Environmental Protection Agency

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EPA Toll-free number: 800-435-9233

PUBLIC COMMENT SHEET

for Davis Mill Creek Removal Action

EPA encourages public input as an important contribution to the site cleanup process. Please send comments on the proposed removal action and the other alternatives considered for the Davis Mill Creek watershed, postmarked no later than June 11, to:

Loften Carr, Remedial Project Manager
U.S. Environmental Protection Agency
Waste Management Division (11th Floor)
61 Forsyth Street, SW
Atlanta, GA 30303-8960

Phone: 404-562-8804
Fax: 404-562-8788
E-mail: Carr.Loften@epa.gov
Toll-free: 800-435-9233

Name: _____ Phone: _____

Address: _____ City/State: _____ Zip: _____

Comments: _____

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City: _____ State: ____ Zip: _____

Place
Stamp
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